

Precipitation Processing System (PPS)



STORM User Guide



Version 2.4

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1.0 INTRODUCTION

1.1 DESCRIPTION

STORM (<https://storm.pps.eosdis.nasa.gov>) is a publicly available Web-based data access interface for the Global Precipitation Measurement (GPM) Mission's Precipitation Processing System (PPS). PPS is one of the first measurement-based processing systems approved by NASA Headquarters; it employs a recognized scientific measurement and provides continuity between data from previous and future satellite missions. PPS generates precipitation data using radar and microwave measurements from the Precipitation Measurement Missions (PMM), including GPM and the Tropical Rainfall Measuring Mission (TRMM).

The screenshot shows the STORM web interface. At the top is the NASA logo and the text "National Aeronautics and Space Administration". To the right are links for "+ PPS Contacts" and "+ Related Links". Below this is a banner with the word "STORM" in large, stylized letters. Underneath the banner are navigation tabs: "- HOME", "+ DATA ACCESS", "+ TOOLS", "+ PRODUCT INFORMATION", and "+ REGISTRATION". The "HOME" tab is selected.

On the left side, there is a "Need Help?" section with links to "STORM User Guide" and "Help Desk". Below that is a "News" section with two entries: "11/30/2016 - New GPM SLH caveats are available to peruse if you are using this product." and "11/30/2016 - New TRMM V7A SLH caveats are available to peruse if you are using this product."

The main content area features a message about the transition from GPM V03 to V04. Below this are two sections: "PPS Data Access" and "PPS Public Archive". To the right of these sections are three boxes: "PPS Precipitation Processing System (PPS)", "Global Precipitation Measurement Mission (GPM)", and "Tropical Rainfall Measuring Mission (TRMM)".

At the bottom, there is a table of available products:

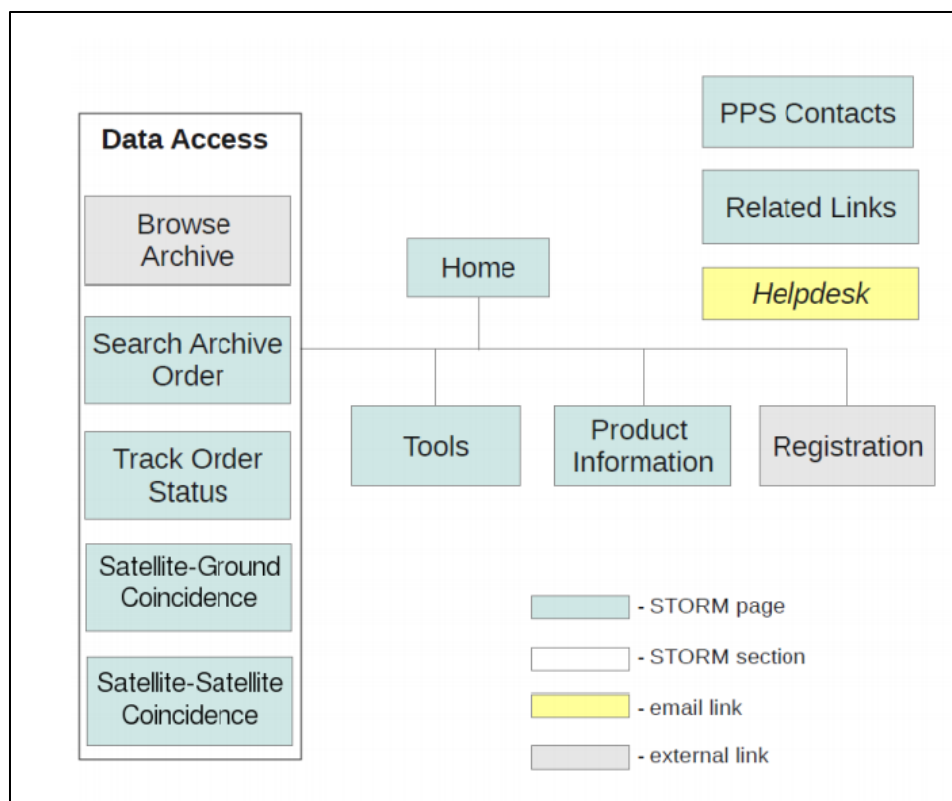
Data Type	Algorithm	Satellite	Instrument	Primary Content
1A	1A01	TRMM	VIRS	Counts
1A	1A11	TRMM	TMI	Counts
1A	1A21	TRMM	PR	Counts
1A	1AGMI	GPM	GMI	Counts
1B	1B01	TRMM	VIRS	Radiance
1B	1B11	TRMM	TMI	Brightness Temperature
1B	1B21	TRMM	PR	Radar Power

1.2 PURPOSE

The purpose of STORM is to provide the science community, students, and the public with an opportunity to learn about GPM data, search for data, order custom subsets, and subscribe to receive subset products produced in the future.

1.3 SITE MAP

Depicted and described below are the main elements of the STORM site.



Data Access is the core of STORM that allows users to access PPS data in various ways.

- ***Browse Archive*** is a link to the PPS public online archive. Users can search for data by drilling down through the directories.
- ***Search Archive/Order*** is the interface to use when searching for data based on various parameters, setting up subscriptions, and ordering custom subsets.
- ***Track Order Status*** allows you to check on the status of your orders and subscriptions, and to cancel subscriptions.
- ***Satellite-Ground and Satellite-Satellite Coincidence*** allow you to explore the coincidence interfaces without requiring registration or involving data download.

Tools provides links to tools for exploring and using PPS data. This page includes links to the 3D Web-Based data visualizations generated using CesiumJS. You can find a guide to those products on the Tools page as well.

Product Information provides links to documentation related to PPS products.

Registration is an external link to a Web-based tool for registering your e-mail to access PPS products through FTP or to order through STORM.

PPS Contacts provides contact information of PPS personnel and affiliates.

Related Links provides links to useful and relevant Web sites.

Helpdesk is a link from which to send an e-mail to the PPS Helpdesk.

2.0 DATA ACCESS USAGE SCENARIOS

The scenarios below describe the typical usage of the STORM data search and ordering interface. To begin, click on Data Access on the horizontal menu on the top, or if you are on a different page of the Data Access section, click on Search Archive/Order on the left navigation menu.

To access the Data Search/Order interface, you are required to provide an e-mail address.

NASA National Aeronautics and Space Administration

+ PPS Contacts
+ Related Links

STORM

+ HOME + DATA ACCESS + TOOLS + PRODUCT INFORMATION + REGISTRATION

Data Access

+ BROWSE ARCHIVE
+ SEARCH ARCHIVE / ORDER
+ TRACK ORDER STATUS
+ SAT - GROUND COINCIDENCE
+ SAT - SAT COINCIDENCE

PPS is currently undergoing transition from GPM V03 to V04. Certain products and orders may be delayed or temporarily unavailable during this period. For updates on transition progress, click [here](#).

Update 10/05/16: Due to an error, PPS will reprocess V04A L1-L3 SSMIS data starting with the last orbit of July 18, 2016 as V04B through the current date and beyond. Please see [this document](#) for more information.

Email

Required

Submit Request Clear Form

Need Help?

- Click on [?](#) for context specific help.
- STORM User Guide
- Help Desk

SECURITY

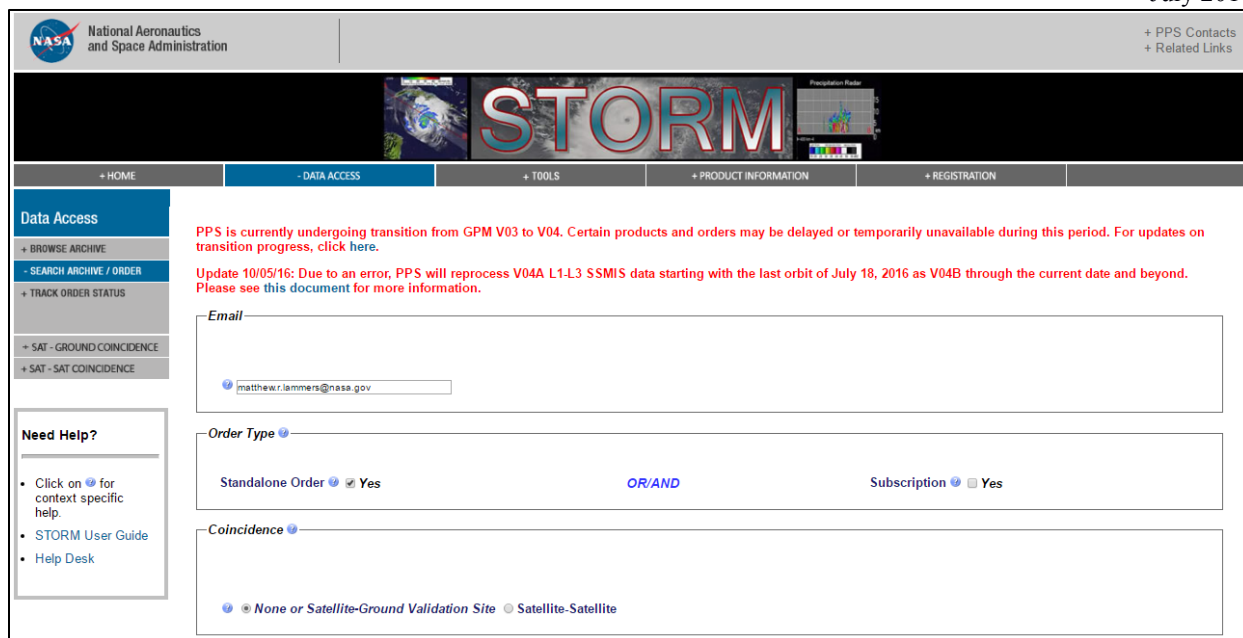
NASA / PPS may provide links to Web pages that are not part of the NASA Web family or nasa.gov domain. These sites are managed by organizations, companies, or individuals and not under NASA control, and NASA is not responsible for the information or links you may find there. NASA provides links to these sites merely as a convenience. NASA is not responsible for the information collection practices of non-NASA sites. Once you link to another site, you are subject to the privacy policy of the new site, and you should read that site's policies on privacy and information collection.

Curator: Matthew Lammers

This e-mail must be registered and verified with PPS; otherwise, you will be prompted to complete the registration process. If you see this message, click on Register to be directed to an external tool to register your e-mail for access to PPS data.

**** This email is not registered with PPS. Please Register before submitting a request**

Once a registered e-mail address is provided, you may search and order PPS data based on various criteria.



NASA National Aeronautics and Space Administration

+ PPS Contacts
+ Related Links

STORM

+ HOME - DATA ACCESS + TOOLS + PRODUCT INFORMATION + REGISTRATION

Data Access

- + BROWSE ARCHIVE
- SEARCH ARCHIVE / ORDER
- + TRACK ORDER STATUS
- + SAT - GROUND COINCIDENCE
- + SAT - SAT COINCIDENCE

Need Help?

- Click on [help](#) for context specific help.
- [STORM User Guide](#)
- [Help Desk](#)

PPS is currently undergoing transition from GPM V03 to V04. Certain products and orders may be delayed or temporarily unavailable during this period. For updates on transition progress, click [here](#).

Update 10/05/16: Due to an error, PPS will reprocess V04A L1-L3 SSMIS data starting with the last orbit of July 18, 2016 as V04B through the current date and beyond. Please see [this document](#) for more information.

Email

Order Type ☒ Standalone Order ☒ Yes OR/AND ☐ Subscription ☐ Yes

Coincidence ☒ ☐ None or Satellite-Ground Validation Site ☐ Satellite-Satellite

2.1 SEARCH AND ORDER FULL GRANULES

2.1.1 Search for Granules By Product Type, Temporal Criteria, and Geographic Location

2.1.1.1 Overview

These are the steps to perform the most basic search for granules. The only required inputs are Product Type and Temporal Criteria. You may also select a geographic location to limit the search results to a specific geographic area. In this scenario, the result of the search is a list of full granules that can be downloaded immediately one at a time. For your convenience, instead of downloading granules individually you may choose to submit an order and receive an e-mail with a list of granule locations at the online archive and scripts to retrieve the files.

2.1.1.2 Search Criteria Selection

2.1.1.2.1 Select Specific Geographic Area Option

Order Options

Note: These features are available only for certain Product Types

Specific Geographic Area (including % of precip. filter) ☒ Yes

Subset Geographically ☐ Yes

Parameter Subsetting ☐ Yes


By selecting Specific Geographic Area, you can limit your search results to full granules that include data for a specific geographic area. Some granules may extend outside of the defined area. When selected, a map will display at the bottom of the page.

Spatial Area Of Interest

**** You must specify a value for minimum and maximum Latitude and Longitude**

Use the buttons on the top-left to select a geographic area

Lat Lng:

Place mouse over  to view the name of a Ground Validation Site.



Northern Latitude Eastern Longitude

Southern Latitude Western Longitude

This map is where you define your specific geographic area. You can zoom in and out and also choose to display a map or satellite image. To define a specific area, input Latitude and Longitude values and either click the Draw button at the lower left or click on the square at the top left and use your mouse to define the geographic area.

2.1.1.2.2 Select Product Type

Product Type

Required

Left click on the header to sort rows. Right click to show/hide columns

Sel	Data Type	Algorithm	Start Time	Frequenc	Satellite or Ground Validation Site	Instrume	Primary Content	Format	Spatial Extent
<input type="checkbox"/>									
<input type="checkbox"/>	2A	2A23	1997-12-07 23:57:17	ORBIT	TRMM	PR	Rain Type	hdf4	
<input type="checkbox"/>	2A	2A25	1997-12-07 23:57:17	ORBIT	TRMM	PR	Precipitat	hdf4	
<input type="checkbox"/>	2A	2ADPR	2014-03-08 22:09:50	ORBIT	GPM	DPR	Precipitat	hdf5	
<input type="checkbox"/>	2A	2ADPRENV	2014-03-08 22:09:50	ORBIT	GPM	DPR	Environm Temperat	hdf5	
<input type="checkbox"/>	2A-CLIM	2AGPROFAMSR2	2014-02-28 22:43:27	ORBIT	GCOMW1	AMSR2	Precipitat	hdf5	
<input type="checkbox"/>	2A	2AGPROFAMSR2	2014-02-01 23:02:00	ORBIT	GCOMW1	AMSR2	Precipitat	hdf5	
<input type="checkbox"/>	2A-CLIM	2AGPROFGMI	2014-03-04 17:59:32	ORBIT	GPM	GMI	Precipitat	hdf5	
<input type="checkbox"/>	2A	2AGPROFGMI	2014-03-04 17:59:32	ORBIT	GPM	GMI	Precipitat	hdf5	
<input type="checkbox"/>	2A	2AGPROFMHS	2014-02-01 23:58:16	ORBIT	METOPB	MHS	Precipitat	hdf5	
<input type="checkbox"/>	2A	2AGPROFMHS	2014-02-01 22:31:26	ORBIT	NOAA19	MHS	Precipitat	hdf5	


Total Product Types selected: 0 Note: Some selected Product Types might not be visible if filters are used

This is the list of available science products. The list of available products changes depending on the selected Order Options.

To select all products, select the checkbox at the top left. Left click on a column header to sort rows by that column. Right click on a column header to hide/show columns.





Data Type	Algorithm	Start Time	Frequenc
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2A	2A23		
2A	2A25		
2A	2ADPR		
2A	2ADPRI		
2A-CLIM	2AGPR		

☒ Data Type
☒ Algorithm
☒ Start Time
☐ Stop Time
☐ Type
☒ Frequency
☒ Satellite or Ground Validation Site
☒ Instrument
☒ Primary Content
☒ Format
☒ Spatial Extent
☐ Resolution

To get information about an algorithm, click on the  icon next to an algorithm name. It will provide you with a brief description and in most cases with a link to full documentation.



You may narrow down the list of product types by using filters (pull-down menus and text boxes) in the header.

Columns				
Frequency 	Satellite or Ground Validation Site 	Instrument 	Primary Content 	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
ORBIT	CORIOLIS	PR	Cross Section	
ORBIT	F16	PR	Rain Type	
ORBIT	F17	PR	Precipitation	
ORBIT	F18	PR	Precipitation	
ORBIT	F19	PR	Precipitation	
ORBIT	GCOMW1	DPR	Precipitation	
ORBIT	GPM	DPR	Environmental Temperature	
ORBIT	METOPA	AMS2	Precipitation	
ORBIT	METOPB	AMS2	Precipitation	
ORBIT	MT1	AMS2	Precipitation	
ORBIT	NOAA18	AMS2	Precipitation	
ORBIT	NOAA19	AMS2	Precipitation	
ORBIT	NPP	AMS2	Precipitation	
ORBIT	TRMM	AMS2	Precipitation	
ORBIT	MULTIPLE	AMS2	Precipitation	
ORBIT	NPP	ATMS	Precipitation	
ORBIT	GPM	GMI	Precipitation	
ORBIT	GPM	GMI	Precipitation	

2.1.1.2.3 *Select Temporal Criteria*

Temporal criteria can be specified either as Date Range or Orbit Numbers.

The screenshot shows a dialog box titled "Temporal Criteria". At the top, there are two radio buttons: "Date Range" (which is selected) and "Orbit Numbers". Below this, a red warning icon is followed by the text "Required start date". Underneath, it says "Valid range is between 20140304 and 20170208". The format "YYYYMMDD [HH:MM]" is shown, with a note "[] = optional fields" and a help icon. At the bottom, there are two input fields: "Start Date/Time" and "Stop Date/Time", each with a small calendar icon to its right.

By default, you are prompted to provide the Start Date/Time and Stop Date/Time of the data you are requesting. If time is not specified (date supplied only), the Start Time defaults to midnight (00:00:00) of the date specified. The Stop Time defaults to 23:59:59 of the date specified.

The screenshot shows the same "Temporal Criteria" dialog box, but now the "Orbit Numbers" radio button is selected. A red warning icon is followed by the text "Required". To the right, an example is given: "Example: 23456,23467,25600-25700". Below this, it says "List separate orbits or specify a range using '-'". There are three input fields on the right, each corresponding to a platform on the left: "GPM orbits", "NOAA18 orbits", and "TRMM orbits".

If the Orbit Numbers option is selected, you are prompted to specify orbit ranges for each platform to be included in the search results. For products that are not "Orbit" based (Level 3), Orbit Number will refer to the day or month of the year (1-12 for monthly products, 1-365 for daily products), so for products that span multiple years, you will get files for the same day each year the product was available.

2.1.1.2.4 Select Data Format

Currently a window to select a different data format from HDF5 will only appear if you select the Level 1C GMI or Level 3 IMERG-HH/M products. STORM has the ability to output the 1C GMI product in BUFR format effective May 2017, and so the option is available beneath the Date Range window. Similarly, Level 3 IMERG-HH/M can be output in GRIB2 format using this toggle. It can be expected that future developments will allow other products to be output in different formats, as well as other formats being selectable through this window.

2.1.1.3 View Granules in Search Results; Download/Select Granules To Include in Your Order

Search Results

Required for Order Submission

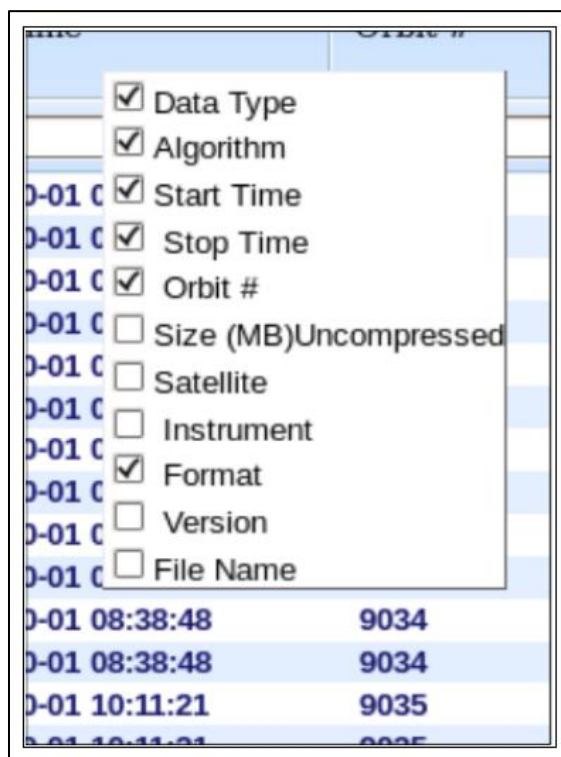
Left click on the header to sort columns. Right click to view additional info (file name, satellite, instrument, format and version).

Select	Data Type	Algorithm	Download / View	Start Time	Stop Time	Orbit #	Format
<input type="checkbox"/>							
<input type="checkbox"/>	2A	2ADPR		2015-01-31 23:22:21	2015-02-01 00:54:54	5264	hdf5
<input type="checkbox"/>	3A	3GPROF		2015-02-01 00:00:00	2015-02-01 23:59:59	32	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 00:00:00	2015-02-01 00:29:59	1	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 00:30:00	2015-02-01 00:59:59	2	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 00:54:55	2015-02-01 02:27:27	5265	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 01:00:00	2015-02-01 01:29:59	3	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 01:30:00	2015-02-01 01:59:59	4	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 02:00:00	2015-02-01 02:29:59	5	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 02:27:28	2015-02-01 04:00:01	5266	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 02:30:00	2015-02-01 02:59:59	6	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 03:00:00	2015-02-01 03:29:59	7	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 03:30:00	2015-02-01 03:59:59	8	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 04:00:00	2015-02-01 04:29:59	9	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 04:00:02	2015-02-01 05:32:34	5267	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 04:30:00	2015-02-01 04:59:59	10	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 05:00:00	2015-02-01 05:29:59	11	hdf5

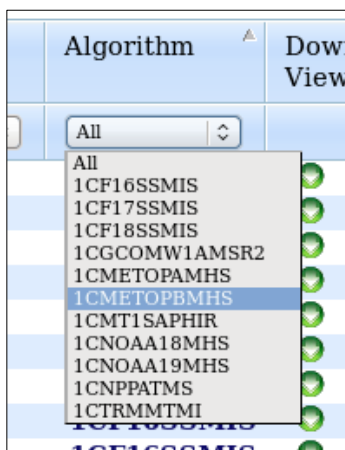
Total Granules selected: 0

1 2 3 4 5 6 7 8 9 10 → Records from 1 to 16 of 734

To select all granules, select the checkbox at the top left. If there are more than 2,000 granules in the list, only 2,000 will be available, but by selecting all, the order will include all granules. Left click on a column header to sort rows by that column. Right click on a column header to hide/show columns.



You may narrow down granule search results by using filters (pull-down menus and text boxes) in the header.



To download a granule, click on the arrow icon:

Need Help?

- Click on for context specific help.
- STORM User Guide
- Help Desk

Number of granules
734

Search Results

Required for Order Submission

Left click on the header to sort columns. Right click to view additional info (file name, satellite, instrument, format and version).

Select	Data Type	Algorithm	Download / View	Start Time	Stop Time	Orbit #	Format
<input type="checkbox"/>	2A	2ADPR		2015-01-31 23:22:21	2015-02-01 00:54:54	5264	hdf5
<input type="checkbox"/>	3A	3GPROF		2015-02-01 00:00:00	2015-02-01 23:59:59	32	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 00:00:00	2015-02-01 00:29:59	1	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 00:30:00	2015-02-01 00:59:59	2	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 00:54:55	2015-02-01 02:27:27	5265	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 01:00:00	2015-02-01 01:29:59	3	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 01:30:00	2015-02-01 01:59:59	4	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 02:00:00	2015-02-01 02:29:59	5	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 02:27:28	2015-02-01 04:00:01	5266	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 02:30:00	2015-02-01 02:59:59	6	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 03:00:00	2015-02-01 03:29:59	7	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 03:30:00	2015-02-01 03:59:59	8	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 04:00:00	2015-02-01 04:29:59	9	hdf5
<input type="checkbox"/>	2A	2ADPR		2015-02-01 04:00:02	2015-02-01 05:32:34	5267	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 04:30:00	2015-02-01 04:59:59	10	hdf5
<input type="checkbox"/>	3B	3IMERGHH		2015-02-01 05:00:00	2015-02-01 05:29:59	11	hdf5

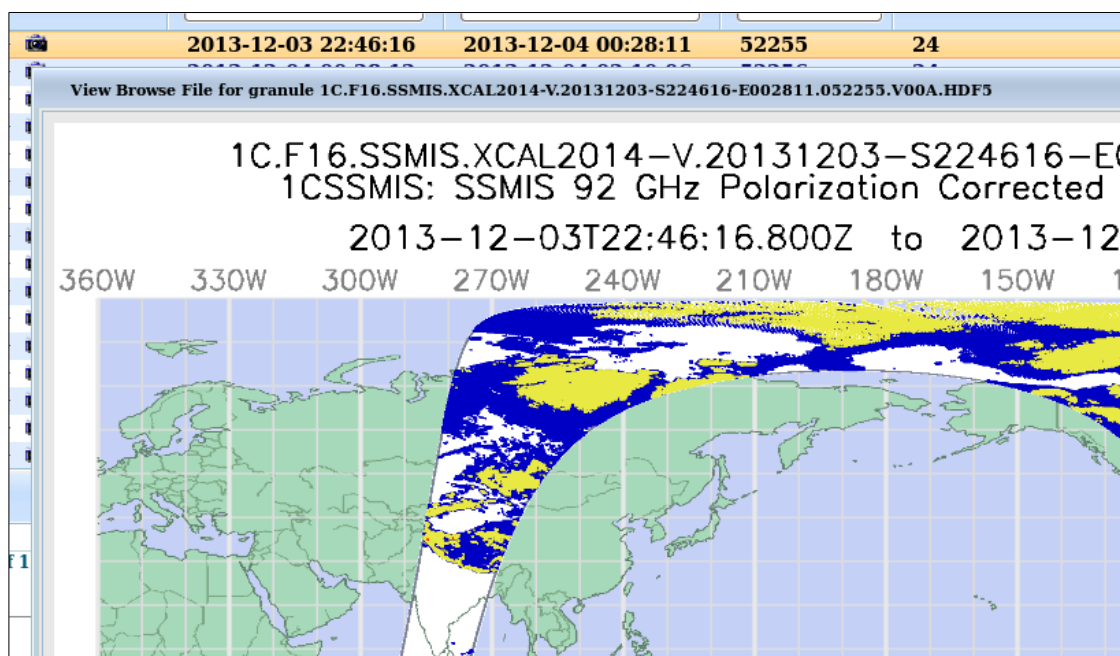
Total Granules selected: 0

1 2 3 4 5 6 7 8 9 10 ... Records from 1 to 16 of 734

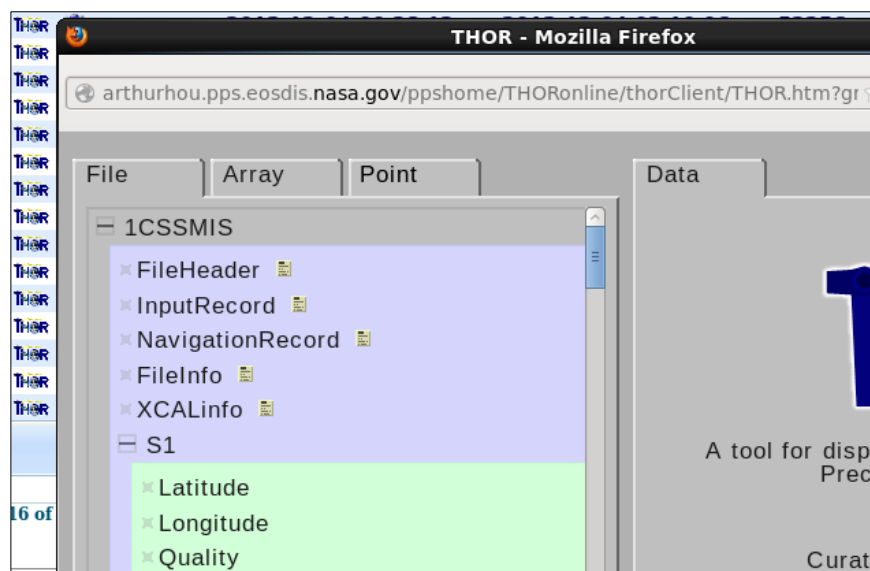
3B-HHR.MS.MR...HDF5


Show a

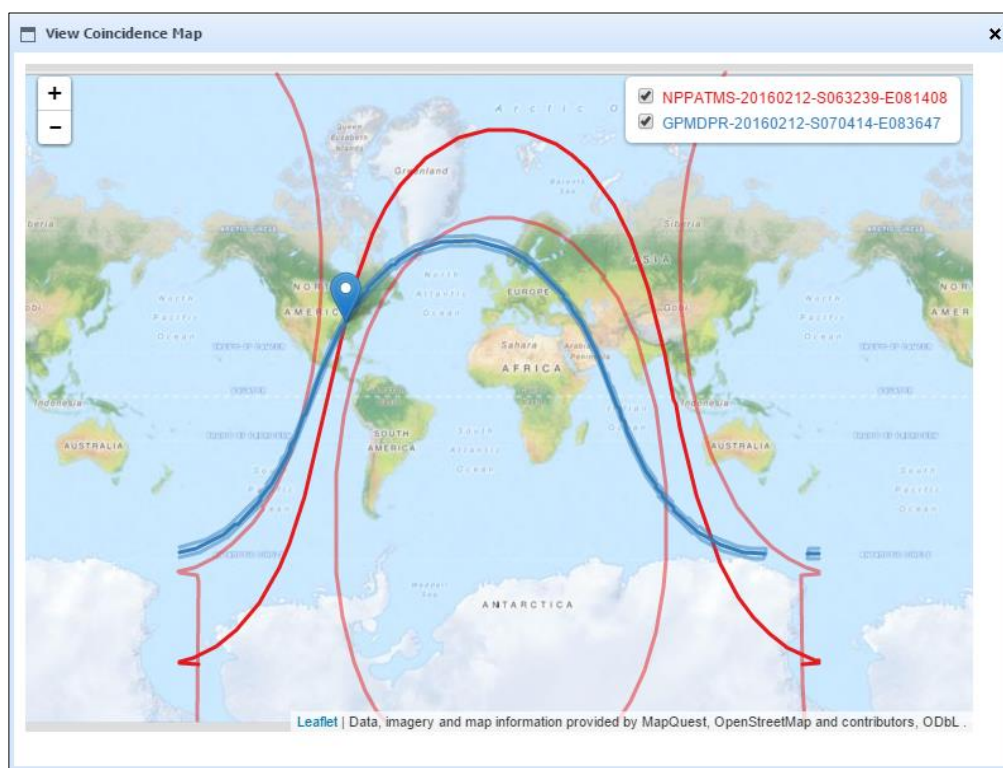
To view a Browse image associated with a granule, click on the camera icon:




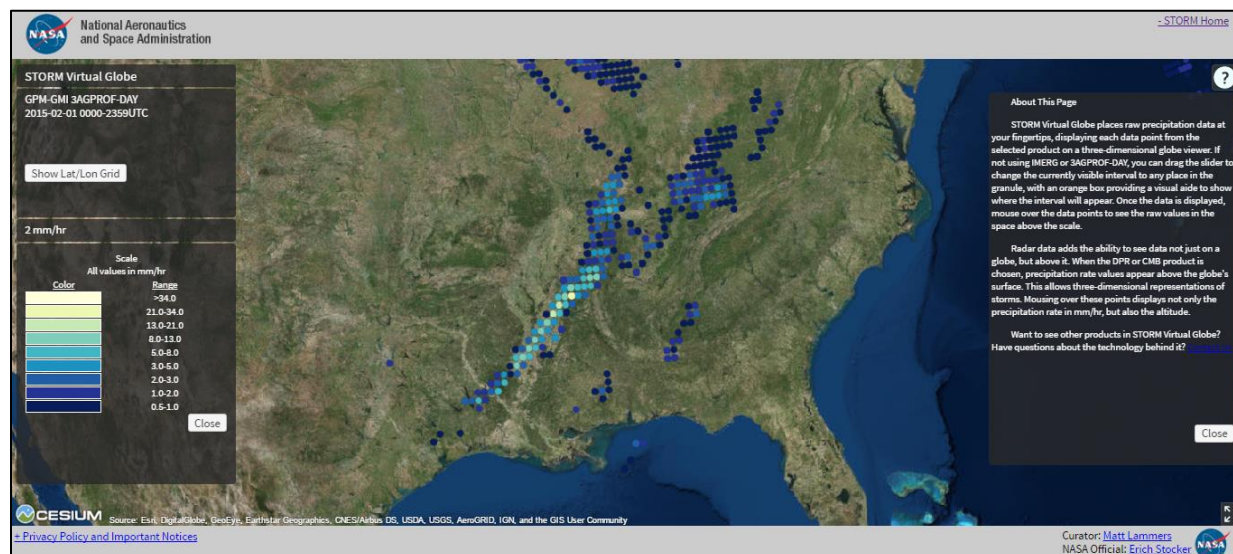
To explore a granule with THOR Online, click on the THOR icon:



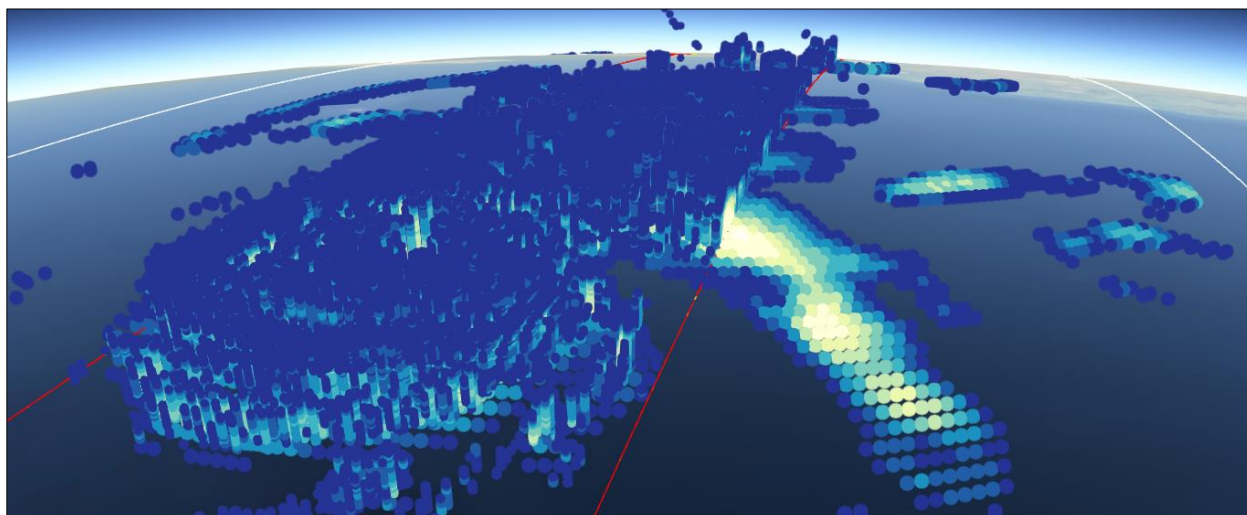
In satellite-satellite coincidence requests, you can dynamically view the coincidence event and the associated swaths by clicking the crossing icon: 



Finally, for a quick interactive visualization of the data, STORM Virtual Globe allows for display of a product using a three-dimensional Earth viewer. It can be accessed by clicking the globe icon: . Swath-based products (currently 2AGPROF, 2ADPR, and 2BCMB) can be scrolled through using a rolling 15-minute window, while grid-based products (currently 3AGPROF-DAY and IMERG Half Hour) display the entire globe of data.



Most products are displayed on the surface of the globe, but 2ADPR features points at all vertical levels with precipitation rates greater than 0.5 mm/hr. All data points can be moused-over to have their values displayed in a text box on the left side of the screen.



In this scenario, granules can be downloaded individually from search results. However, for your convenience, instead of downloading granules individually, you may choose to submit an order and receive an e-mail with a list of granule locations at the online archive and scripts to retrieve the files.

2.1.1.4 Order Submission and Fulfillment

2.1.1.4.1 *Select Script Type To Include With Your Order*

Script Type ⓘ

Select a script type to help access data files

Select Script Type ☐ FTP script ☐ FTP URL ☒ Python

Selecting one or more script types for acquiring your data files is required, although none are selected by default. These files can be run from your command line to automatically download all of the files included in the request and check their validity.

2.1.1.4.2 *Select Types of Files To Include With Your Order*

File Info

Types of files to be included with this Order ☒ **Product** ☐ **Browse**

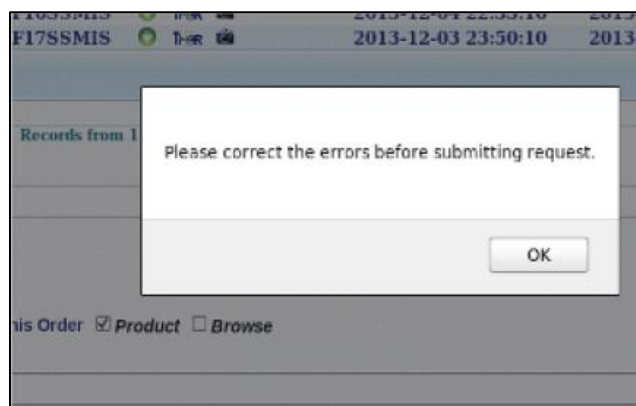
By default, only product files will be included with your order. Note that this option is displayed only if Browse files are available.

2.1.1.4.3 *Submit an Order and View a Confirmation Page*

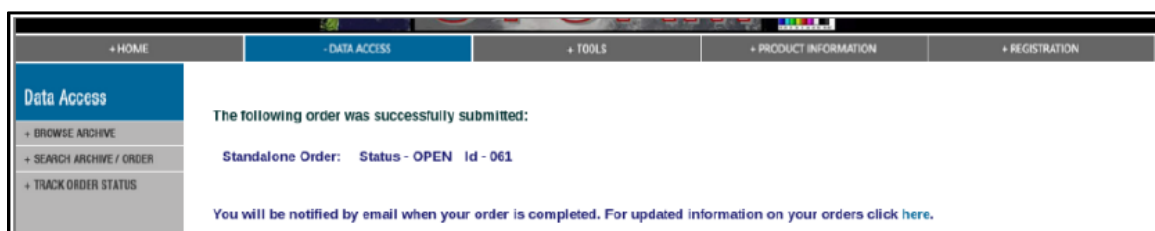
Once all the required information is provided, you can submit your order by clicking on the Submit Request button at the bottom of the page.



If any of the required information is missing, you will get this message:



When the order is successfully submitted, you will get a confirmation page with the order number and a link to the order-tracking page.



2.1.1.4.4 Confirmation E-mail

Once the order is submitted, you will receive a confirmation e-mail with a link to the Order Tracking page (see [Section 2.3](#)).

2.1.1.4.5 Order Fulfillment E-mail

Once an order is fulfilled, you will receive an e-mail with a list of files and the FTP location. It will also include scripts and instructions to retrieve data.

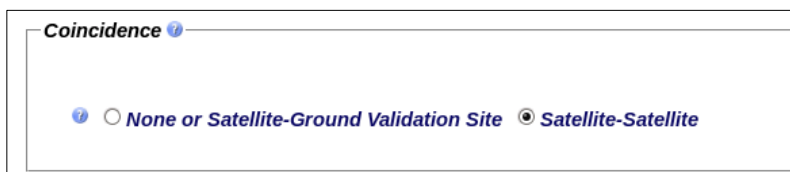
2.1.2 Search for Granules By Satellite-Satellite Coincidence Events

2.1.2.1 Overview

These are the steps to perform a search for full granules based on satellite-satellite coincidence, which is where two specified satellites cross paths within a defined time period. The required input includes Satellite 1, Satellite 2, Crossing Time Tolerance, Product Type, and Temporal Criteria. You may also select a geographic location to limit the coincidence event search results to a specific geographic area. In this scenario, the result of the search is a list of full granules that can be downloaded immediately one at a time. For your convenience, instead of downloading granules individually, you may choose to submit an order and receive an e-mail with a list of granule locations at the online archive and scripts to retrieve the files.

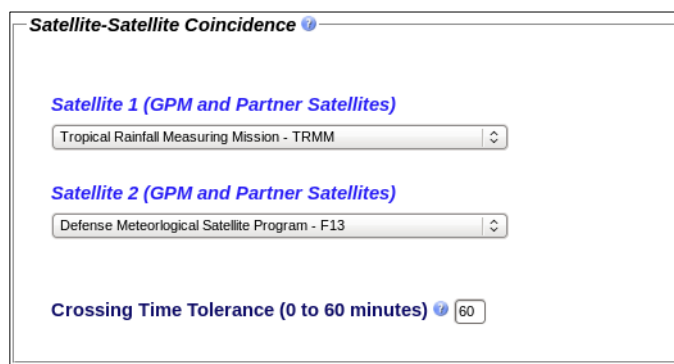
2.1.2.2 Search Criteria Selection

2.1.2.2.1 Select Satellite-Satellite Search Option



Satellite-satellite coincidence is where two specified satellites cross paths within a defined time period.

2.1.2.2.2 Select Satellite 1 and Satellite 2



Satellite-to-satellite coincidence is found using two-line element (TLE) sets as an ephemeris source. Since TLE sets define an average orbit at a certain epoch, the TLE ephemeris drifts, mostly forward or backward along track, over time when compared to a definitive ephemeris source. The TLE ephemeris drift is greater after an orbit boost before a new TLE set is released that defines the new average orbit. The accuracy of TLE sets is dependent upon a number of factors. These range from the particular tracking sensors used and amount of data collected to the type of orbit and condition of the space environment. Since those factors vary from orbit to orbit and set to set, defining an accuracy for TLE sets is extremely difficult. As a guesstimate, coincident event information calculated by PPS is most likely accurate to within 10 seconds or 70 kilometers.

2.1.2.2.3 Specify Crossing Time Tolerance

This is the maximum difference between the time when the first satellite passes over a point on the Earth and the time when the second satellite passes over the same point on the Earth. All coincidence events with crossing time tolerances up to this maximum time are returned.

2.1.2.2.4 Limit Geographic Area (Optional)

Note: These features are available only for certain Product Types

Limit Coincidence events to a specific geographic area   Yes

By selecting "Limit Coincidence events to a specific geographic area," you can limit your search results to events that occur in the specific geographic area you defined. When selected, a map will display at the bottom of the page. See Section [2.1.1.2.1](#) for details.

2.1.2.2.5 Select Product Type

See Section [2.1.1.2.2](#).

2.1.2.2.6 Select Temporal Criteria

See Section [2.1.1.2.3](#).

2.1.2.3 View a List of Events in Search Results as Well as Granules for Each Event; Download Granules or Select Granules To Include in Your Order





Search Results

Required for Order Submission

Select one or more granules to include in your Order.

Click on + for an event to view the granules.

While viewing granules left click on the header to sort columns. Right click to view additional info (file name, satellite, instrument, format and version).

Select	GPM Event Time		GCOMW1 Event Time		Time Difference (Minutes)	Lat	Lon	
<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>				
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 00:24:09		2015-02-01 00:33:37	9	26.861	18.697	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 01:10:11		2015-02-01 01:22:54	13	-27.71	-173.464	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 01:56:14		2015-02-01 02:12:03	16	28.49	-5.596	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 02:42:16		2015-02-01 03:01:20	19	-29.334	162.228	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 03:28:19		2015-02-01 03:50:29	22	30.111	-29.92	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 04:14:22		2015-02-01 04:39:47	25	-30.892	137.921	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 05:00:25		2015-02-01 05:28:57	29	31.666	-54.243	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 15:08:38		2015-02-01 14:39:13	-29	-8.703	-15.617	
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 15:54:37		2015-02-01 15:28:18	-26	9.725	152.26	
	Data Type/Accumulation	Download / View	Algorithm	Version	Satellite	Orbit#	Instrument	Format
	2A	 	ZAGPROFAMSR	V04A	GCOMW1	14418	AMSR2	hdf5
	2A	 	ZAGPROFGMI	V04A	GPM	5274	GMI	hdf5
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 16:40:36		2015-02-01 16:17:31	-23	-10.788		-39.886
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 17:26:35		2015-02-01 17:06:37	-20	11.81		127.984
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 18:12:35		2015-02-01 17:55:51	-17	-12.809		-64.144
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 18:58:34		2015-02-01 18:44:56	-14	13.831		103.718
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 19:44:33		2015-02-01 19:34:10	-10	-14.885		-88.442
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 20:30:33		2015-02-01 20:23:16	-7	15.847		79.435
<input type="checkbox"/>	<input type="checkbox"/>	2015-02-01 21:16:33		2015-02-01 21:12:30	-4	-16.838		-112.708
Total Events selected: 0								

1 2 3 4 5 6 7 8 9 10 --

Records from 1 to 16 of 214

Left click on a column header to sort rows by that column. To select granules for all events, select the checkbox at the top left. To select all granules for an event, select the checkbox on the left associated with an event. Click on "+" for an event to view the granules. See Section [2.1.1.3](#) for information on granules display.

You may narrow down a list of events by entering time in the text box in the result header.

TRMM Event Time
2000-12-01 00
2000-12-01 00:11:03
2000-12-01 00:10:26

2.1.2.4 Order Submission and Fulfillment

See Section [2.1.1.4](#). Note that in this case the files delivered with your order will also include a file with the mapping between the coincidence events and the granules.

2.1.3 Search for Granules By Satellite-Ground Validation Site Coincidence

2.1.3.1 Overview

These are the steps to perform a search for full granules based on Satellite-Ground Validation Site coincidence. The only system required input is Product Type and Temporal Criteria. However, to limit granule search results to coincidence with a Ground Validation (GV) site, you must select a geographic area over a specific GV site. The GV sites are marked on the map. In this scenario, the result of the search is a list of full granules that can be downloaded immediately one at a time. For your convenience, instead of downloading granules individually you may choose to submit an order and receive an e-mail with a list of granule locations at the online archive and scripts to retrieve the files.

2.1.3.2 Search Criteria Selection

2.1.3.2.1 Select Geographic Location Over a Ground Validation Site

See Section [2.1.1.2.1](#).

2.1.3.2.2 Select Product Type

See Section [2.1.1.2.2](#).

2.1.3.2.3 Select Temporal Criteria

See Section [2.1.1.2.3](#).

2.1.3.2.4 View Granule in Search Results; Download Granules or Select Granules To Include in Your Order

See Section [2.1.1.3](#).

2.1.3.3 Order Submission and Fulfillment

See Section [2.1.1.4](#).

2.2 ORDER CUSTOM SUBSETS

Note that not all the products can be subsetted. When subset options are selected, a list of available products is updated accordingly.

2.2.1 Order Geographic Subset With % of Precipitation

2.2.1.1 Overview

These are the steps to order full and partial granules within a specific geographic area. Optionally, you may also narrow down the granules included in your order by a percent of precipitation. You may combine this type of subset with a parameter subset (see Section 2.2.2). In this scenario you cannot download granules from search results and must place an order. Subsetted products are not available immediately, as they have to be produced. The Geographic Subset option is not available when granules are searched for by satellite-satellite coincidence.

2.2.1.2 Search Criteria and Order Options Selection

2.2.1.2.1 *Select Specific Geographic Area Option*

See Section [2.1.1.2.1](#).


In addition, in the case of a geographic subset, you may provide a Location Alias to be used as part of the output file name. Location Alias defaults to the latitude/longitude if not provided.


Location Alias (letters and numbers only) 


2.2.1.2.2 *Select Subset Geographically*


Order Options

Note: These features are available only for certain Product Types

Specific Geographic Area (including % of precip. filter)  ☒ Yes

Subset Geographically  ☒ Yes

Include only swath based products with % of precipitation >= 

Parameter Subsetting  ☐ Yes

By selecting Subset Geographically, you can limit your search results to full and partial granules that include data for that specific geographic area you defined. No granules will extend outside of the defined area.

2.2.1.2.3 Provide Percent of Precipitation (Optional)

By providing value for "Include only swath-based products with % of precipitation," you are requesting that your order include only granules that have at least the percent of precipitation that you specified. Please note that some or all of the products displayed and selected in your Search Results may not be included in your received final order because the PPS ordering system can only calculate and search for specific granules that meet your precipitation percentage criteria after you submit your order. A typical range for percent of precipitation is between 5% and 20%, unless you are looking at an extremely dry area or an area with frequent precipitation.

2.2.1.2.4 Select Product Type

See Section [2.1.1.2.2](#).

2.2.1.2.5 Select Temporal Criteria

See Section [2.1.1.2.3](#).

2.2.1.3 View Granules in Search Results; Select Granules To Include in Your Order

See Section [2.1.1.3](#). Note that only full granules can be viewed with THOR Online and in Browse images. Subset granules cannot be downloaded immediately, and an order must be placed to obtain the result files.

2.2.1.4 Order Submission and Fulfillment

See Section [2.1.1.4](#).

2.2.2 Order Parameter Subset

2.2.2.1 Overview

These are the steps to order granules containing only specific science parameters. You may combine this type of subset with a geographic subset (see Section [2.2.1](#)). In this scenario, you cannot download granules from search results and must place an order. Subset products are not available immediately, as they have to be produced. The Parameter Subset option is not available when granules are searched for by satellite-satellite coincidence. You cannot further subset channels of a parameter.

2.2.2.2 Search Criteria and Order Options Selection

2.2.2.2.1 Select Parameter Subset Option

Order Options

Note: These features are available only for certain Product Types

Specific Geographic Area (including % of precip. filter) ☐ Yes

Parameter Subsetting ☒ Yes

By selecting Parameter Subsetting, you are requesting to produce granules containing only specific science parameters.

2.2.2.2.2 Select Product Type

Product Type

Left click on the header to sort rows. Right click to show/hide columns

Select	Data Type	Algorithm	Start Time	Frequency	Satellite or Ground Validation Site	Instrument	Primary Content	Format	Spatial Extent
<input type="radio"/> 1CAMSR2 (Frequency,Satellite,Instrument combination: 1) - GCOMW1									
<input type="radio"/> 1CATMS (Frequency,Satellite,Instrument combination: 1) - NPP									
<input type="radio"/> 1CGMI (Frequency,Satellite,Instrument combination: 2) - GPM									
<input checked="" type="radio"/> 1CMHS (Frequency,Satellite,Instrument combination: 4) - NOAA19									
<input checked="" type="checkbox"/>	1C	1CMHS	2006-12-31 23:04:54	ORBIT	NOAA18	MHS	Brightness Temperature	hd15	
<input checked="" type="checkbox"/>	1C	1CMHS	2007-05-21 23:53:56	ORBIT	METOPA	MHS	Brightness Temperature	hd15	
<input checked="" type="checkbox"/>	1C	1CMHS	2014-02-01 23:58:16	ORBIT	METOPB	MHS	Brightness Temperature	hd15	
<input checked="" type="checkbox"/>	1C	1CMHS	2014-02-01 22:31:26	ORBIT	NOAA19	MHS	Brightness Temperature	hd15	
<input type="radio"/> 1CSAPHIR (Frequency,Satellite,Instrument combination: 1) - MT1									
<input type="radio"/> 1CSSMIS (Frequency,Satellite,Instrument combination: 4) - F17									
<input type="radio"/> 1CTMI (Frequency,Satellite,Instrument combination: 1) - TRMM									
Total Product Types selected: 4 Note: Some selected Product Types might not be visible if filters are used									

When the Parameter Subset option is selected, you can only include products associated with one algorithm per order. By selecting a radio button next to an algorithm, you can select all the product types associated with that algorithm. You may exclude some of them by unchecking a checkbox associated with a specific Frequency/Satellite/Instrument combination that defines a product. You may view the product types associated with an algorithm by clicking on "+" next to an algorithm and selecting individual products using checkboxes.

See Section [2.1.1.2.2](#) for information on sorting columns, filtering products, hiding/showing columns, and viewing descriptions and full documentation for an algorithm.

2.2.2.2.3 *Select Temporal Criteria*

See Section [2.1.1.2.3](#).

2.2.2.2.4 *Select Science Parameters*

Parameter Subset

Parameter Categories - [dropdown]

At least one non-required science data parameter is required to be selected
click on +/- to expand or collapse parameter tree

- 2AGPROFGMI
 - GprofDHeadr
 - speciesDescription
 - hgtTopLayer
 - temperatureDescriptions
 - clusterProfiles
 - S1
 - ScanTime
 - Year (required)
 - Month (required)
 - DayOfMonth (required)
 - Hour (required)
 - Minute (required)
 - Second (required)
 - Millisecond (required)
 - DayOfYear (required)
 - SecondOfDay (required)
 - Latitude (required)

Required
Identifier (Two characters that will be appended to product type) [text input]

Would you like to generate Read and Write routines for this subset? ☒ No ☐ Yes

Output Data Format ☒ ASCII ☐ Binary ☐ HDF

Select the science parameters to be included in result granules. Some parameters are mandatory.

2.2.2.2.5 *Provide an Identifier*

This suffix will be used as a part of the name for the output file to distinguish subsets from full products (e.g., 1C_AC.F16, 1C_Qt.F16, etc.).

2.2.2.2.6 *Request Read and Write Routines for the Subset*

If you select Parameter Subsetting and request the read and write routines for the subsetting product, you will get a requestedCode.tar file along with your subsetting product files.

The requestedCode.tar file contains the PPS Science Algorithm Input/Output Toolkit (TKIO) read routine, write routine, header file, and config files needed for you to read and/or write this subsetting product with the TKIO toolkit.

For example, if you ordered a parameter subsetted 2AGPROFGMI product and given the suffix 'z1' you will get a product file and requestedCode.2AGPROFGMI_z1.tar file. After you untar the requestedCode tar file, you will see the following files:

```
TK_2AGPROFGMIz1_hdf5.h
TKrHDF5_L2AGPROFGMIz1_S1.c
TKrHDF5_L2AGPROFGMIz1_S1.h
TKwHDF5_L2AGPROFGMIz1_S1.c
TKwHDF5_L2AGPROFGMIz1_S1.h
2AGPROFGMIz1_aa.metadata.cfg
2AGPROFGMIz1_hdf5.data.cfg
```

Then you can use these routines in your read program and link with TKIO to read your subsetted product. You can download TKIO from the Tools page in STORM.

2.2.2.2.7 Select Output Data Format

This is the output format of your subsetted product; it is available only for products originally produced in HDF5 format. Subsetted granules for products in HDF4 are produced in HDF4.

While all subset products can be output in ASCII or Binary, only certain variables of certain products can be output in GeoTIFF. These variables include latitude/longitude two-dimensional fields within gridded products. If the user attempts to choose GeoTIFF as a format without having checked any variables to be output that are able to be GeoTIFF'ed, they will be given an alert and their order will not be processed.

2.2.2.3 View Granules in Search Results; Select Granules To Include in Your Order

See Section [2.1.1.3](#). Note that only full granules can be viewed with THOR Online and in Browse images. Subset granules cannot be downloaded immediately, and an order must be placed to obtain the result files.

2.2.2.4 Order Submission and Fulfillment

See Section [2.1.1.4](#).

2.3 CREATE A SUBSCRIPTION



The screenshot shows a form titled "Order Type" with a dropdown arrow. Below the title, there are two options: "Standalone Order" with an unchecked checkbox and "Subscription" with a checked checkbox. The text "OR/AND" is centered between the two options. The "Subscription" option is highlighted with a blue background.

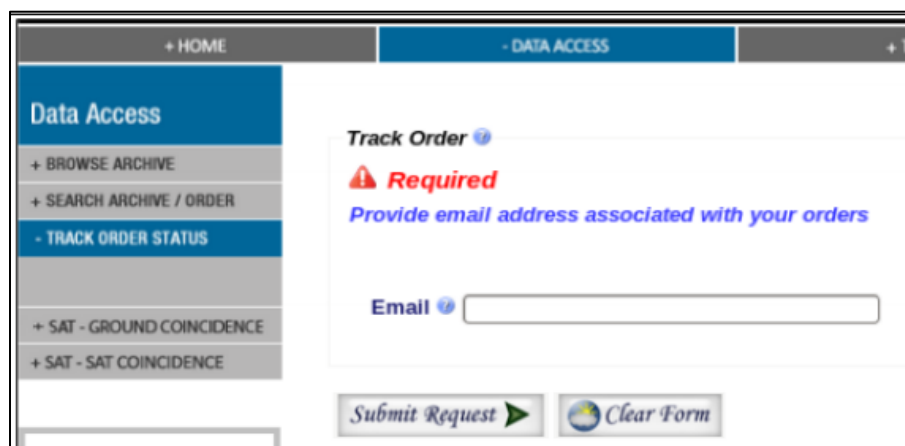
By default, Standalone Order is selected. A standalone order can be placed for data products that are already produced that you want to obtain on a one-time basis. Instead of or in addition to a standalone order, you can select a Subscription option.

A Subscription Order is submitted for a product that has not yet been produced and is being requested for an extended period of time. Subscription Orders are processed daily or are filled as the files are produced and archived (i.e., monthly for certain Level 3 products, etc.).

For a Subscription Order for standard products, the user will receive regular e-mails with a list of links to retrieve the new data files from the public archive. For a Subscription Order for subset products, the user will receive regular e-mails with a list of new data files to retrieve from the user FTP area. Subscriptions can be canceled; see Section [2.4.2.3.2.2](#).

2.4 VIEW ORDER STATUS

2.4.1 Request a Link To Track the Order Status Page



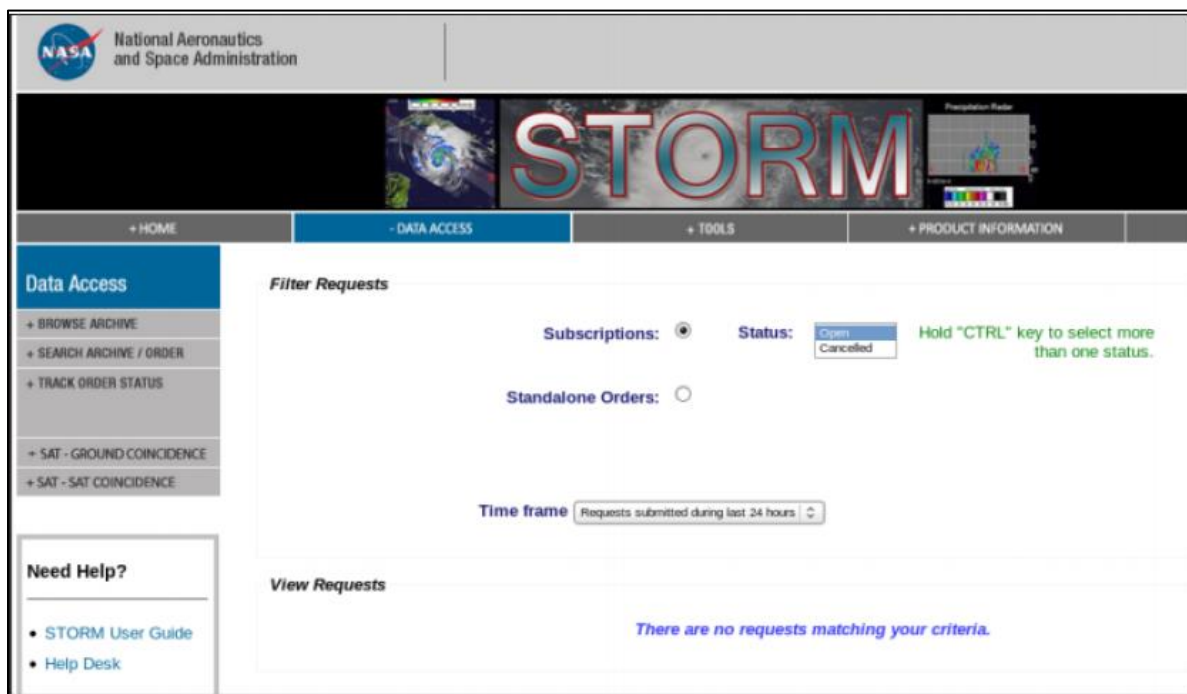
The screenshot shows the "Track Order Status" page. On the left is a sidebar with a "Data Access" menu containing options: "+ BROWSE ARCHIVE", "+ SEARCH ARCHIVE / ORDER", "- TRACK ORDER STATUS" (which is selected and highlighted in blue), "+ SAT - GROUND COINCIDENCE", and "+ SAT - SAT COINCIDENCE". The main content area has a title "Track Order" with a dropdown arrow. Below the title is a red warning icon and the text "Required" in red, followed by the instruction "Provide email address associated with your orders" in blue. There is an "Email" label and a text input field. At the bottom, there are two buttons: "Submit Request" with a green arrow and "Clear Form" with a blue circular icon.

When you submit an order, a confirmation page will be displayed with your order number and a link to track your order. The system also sends you a confirmation e-mail that contains a temporary link to the Track Order Status page. If the link is expired or the confirmation e-mail is lost, you can request a new link by clicking on Track Order Status on the left. You will be prompted to provide an e-mail address associated with your orders.

2.4.2 Track Order Status Page

2.4.2.1 Overview

The top portion of the page, Filter Requests, contains the criteria to filter orders. The bottom portion, View Requests, is used to display the orders based on selected criteria.



2.4.2.2 Select Filters

2.4.2.2.1 Select Subscriptions or Standalone Orders

By default, the Subscriptions option is selected. A Standalone Order is an order placed for data products that have been produced already that you are obtaining on a one-time basis. A Standalone Order is the order created by default for standard products or custom subsets. A Subscription is an option available for custom subsets only, and is created for a product that has not yet been produced and is being requested for an extended period of time. Subscription orders are processed daily or are filled as the files are produced and archived (i.e., monthly for certain Level 3 products, etc.).

2.4.2.2.2 *Select Status*

The values for status selection change depending on the selected order type.

The screenshot shows two sections of the STORM interface. The top section is for 'Subscriptions' and the bottom section is for 'Standalone Orders'. In the 'Subscriptions' section, the 'Status' dropdown menu is open, showing 'Open' and 'Cancelled' options. In the 'Standalone Orders' section, the 'Status' dropdown menu is open, showing 'Success', 'In Progress', and 'Failed' options. A green text提示 'Hold "CTRL" key to select more than one status.' is displayed next to each dropdown menu.

2.4.2.2.3 *Select Time Frame*

This allows you to narrow down the orders displayed by the time frame when it was submitted. The default selection is "Requests submitted during last 24 hours."

The screenshot shows the 'Time frame' dropdown menu in the STORM interface. The menu is open, displaying the following options: 'All Requests', 'Requests submitted during last 24 hours', 'Requests submitted during last 7 days', 'Requests submitted during last 30 days', 'Requests submitted during last 60 days', 'Requests submitted during last 90 days', and 'All Requests'. The 'Requests submitted during last 30 days' option is currently selected.

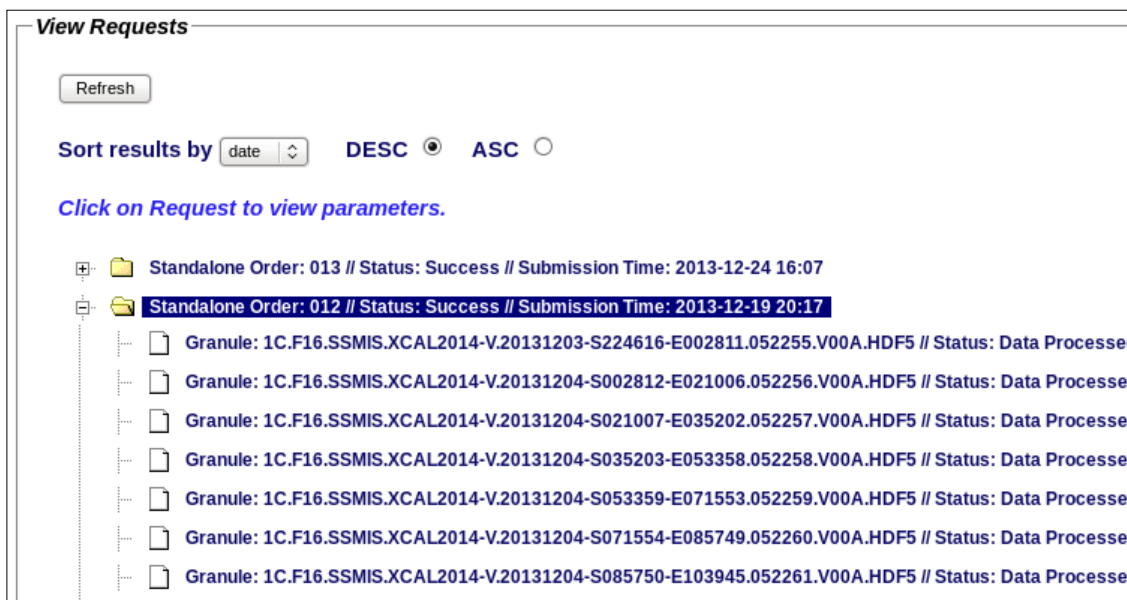
2.4.2.3 *View Requests*

2.4.2.3.1 *View Standalone Orders*

The screenshot shows the 'View Requests' page in the STORM interface. The page has a 'Refresh' button at the top. Below it, there is a 'Sort results by' dropdown menu set to 'date', and two radio buttons for 'DESC' (selected) and 'ASC'. A blue link 'Click on Request to view parameters.' is displayed. Below the link, there is a list of standalone orders with their status and submission time. The list is as follows:

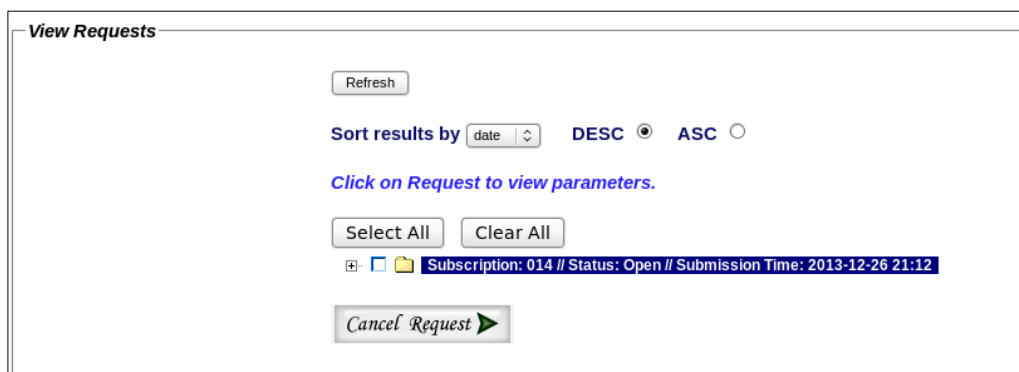
Order ID	Status	Submission Time
013	Success	2013-12-24 16:07
012	Success	2013-12-19 20:17
011	Success	2013-12-19 17:57
010	Failed	2013-12-13 22:23
008	Success	2013-12-13 19:17

By clicking on the "+" sign next to an order with status Success, you can view the list of files delivered with the order.



2.4.2.3.2 Track Status of Subscriptions

2.4.2.3.2.1 View Subscription



By clicking on the "+" next to a subscription, you may view a list of orders associated with this subscription.



View Requests

Refresh

Sort results by

date

DESC

ASC

Click on Request to view parameters.

Select All

Clear All

Subscription: 014 // Status: Open // Submission Time: 2013-12-26 21:12

Order: 1 // Status: Pending Delivery // Process Time: 2013-12-26 21:13

Granule: 1C.TRMM.TMI.XCAL2014-C.20131220-S233231-E010454.091694.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S010455-E023718.091695.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S023719-E040942.091696.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S040943-E054206.091697.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S054207-E071431.091698.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S071432-E084655.091699.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S084656-E101919.091700.V00A.HDF5

Granule: 1C.TRMM.TMI.XCAL2014-C.20131221-S101920-E115142.091701.V00A.HDF5

You can cancel subscriptions by selecting the checkboxes associated with the subscriptions and clicking on the Cancel Request button at the bottom of the page. A confirmation box will appear. Click OK to delete the subscription.

By clicking on the order, you can view the search criteria and order options selected when the order was submitted.



2.4.2.5 Refresh Results

To refresh the list of orders displayed, click on the Refresh button at the top of the View Requests section of the page.




2.4.2.6 Sorting Results

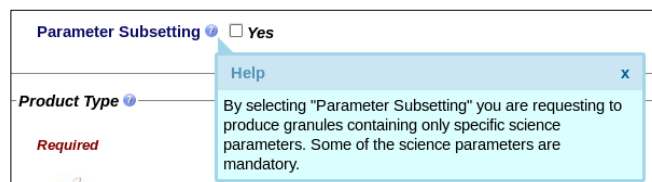
To sort the list of orders in ascending or descending order, use the pull-down and Desc/Asc radio button under the Refresh button. Orders can be sorted by submission date and status.



2.5 GETTING HELP

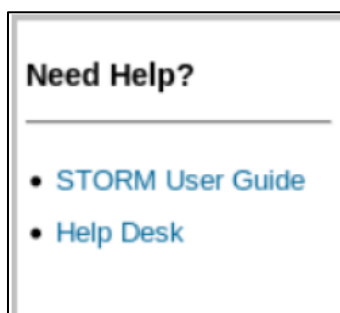
2.5.1 Context-Specific Help

There are  icons throughout the Web site to provide you with context-specific help. When you click on this icon, a pop-up appears with some useful information.



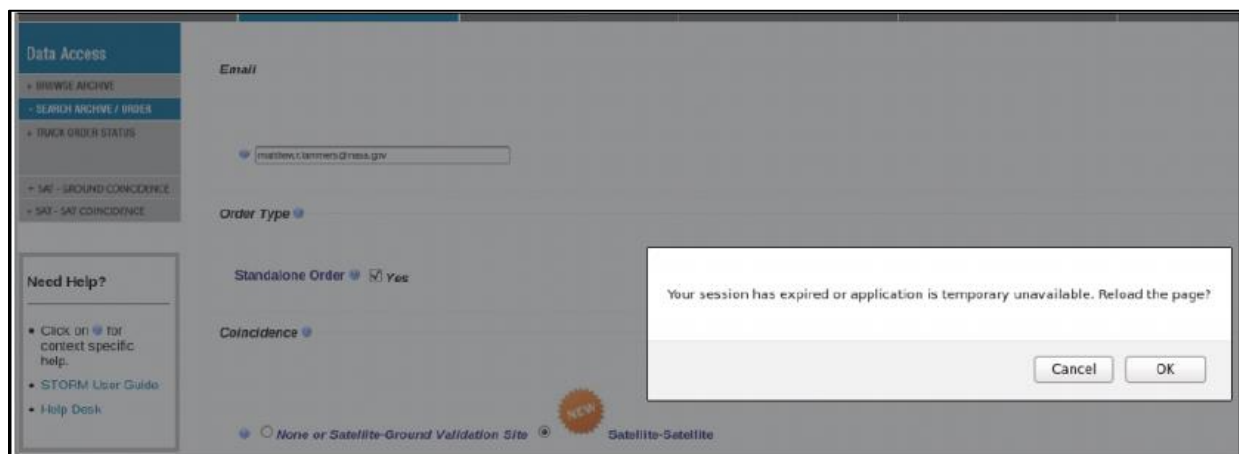
2.5.2 E-mail PPS Helpdesk

A link to send an e-mail to the PPS Helpdesk is located on the left of every page.



2.6 SESSION EXPIRATION

If you start using the Search Archive/Order page, leave it for more than 2 hours, and then attempt to continue using it, the following message will appear: "Your session has expired or application is temporarily unavailable. Reload the page?"



After clicking OK, you can reload the page by either using the Browser Reload button or by clicking on the Clear Form button at the bottom of the page. The search criteria/order options previously selected will be lost.

3.0 SWATH ANALYSIS TOOL

The Swath Analysis Tool, found at <https://storm.pps.eosdis.nasa.gov/storm/Analysis.jsp>, gives users the ability to generate time series of basic statistics from Level 2 products for any geographic domain. The available statistical properties for the variable “Surface Precipitation” include mean, conditional mean, median, maximum, standard deviation, percent of pixels with precipitation, and total swath pixels in domain. The chart generated is fully interactive and contains the ability to jump from a data point to the STORM Virtual Globe visualization of the product. It can be exported as an image, and the data can be exported as a CSV file, either all of the data or just what are visible in the chart.

3.1 SETTING UP A QUERY

Available Instruments:
Click to select one. Hold CTRL and click to select multiple.

GPM-GMI	GPM-DPR	GPM-Ka MS	GPM-Ku
GPM-CMB	TRMM-TMI	NPP-ATMS	GCOMW1-AMSR2
NOAA18-MHS	NOAA19-MHS	METOP-A-MHS	METOP-B-MHS
F16-SSMIS	F17-SSMIS	F18-SSMIS	F19-SSMIS

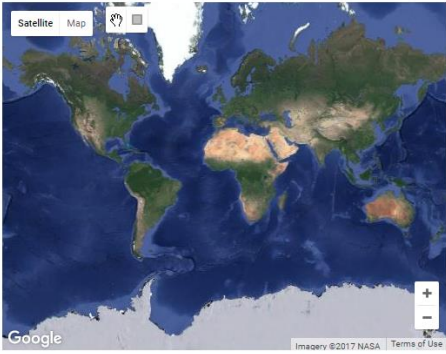
Date Range:
Valid Range is between 20140304 and 20171011
YYYYMMDD [HH:MM]

Start Date/Time

Stop Date/Time

Geographic Domain:
Use the buttons on the top-left to select a geographic area, or type the box into the inputs below.

Lat Lng:



Northern Latitude Southern Latitude

Eastern Longitude Western Longitude

When you start on the page, three boxes will be visible: Available Instruments, Date Range, and Geographic Domain. Values for all of these fields must be input before performing a query by clicking the Get Granules for Chart button.

3.1.1 Instruments

Available for selection are all of the instruments for which we have Level 2 swath data. These include both GMI and DPR from GPM, as well as the microwave instruments from TRMM and the partner satellites. These can be selected one at a time, or in a group. To select multiple instruments, either click and drag the cursor over a cluster, or hold the CTRL button while clicking. As many instruments can be selected as you would like, but only six of them will be represented in the chart at a time.

3.1.2 Date Range

The Date Range field will provide a range starting with the first granule in the STORM archive and ending two days prior to the current date. The Start Date/Time must be prior to the Stop Date/Time for the query to complete successfully. You can select down to the minute the interval in which you are interested, although if only dates are selected, Start Date/Time defaults to 00:00, and End Date/Time defaults to 23:59.

3.1.3 Geographic Domain

There are multiple ways to select a rectangular region. One way is to click the button containing a shaded square at the top of the map. This will change a click-and-drag from moving the map to drawing a box. Note that it is possible to draw a box across the International Date Line, but this will not result in a successful query currently. The box will auto-populate the Latitude and Longitude fields.



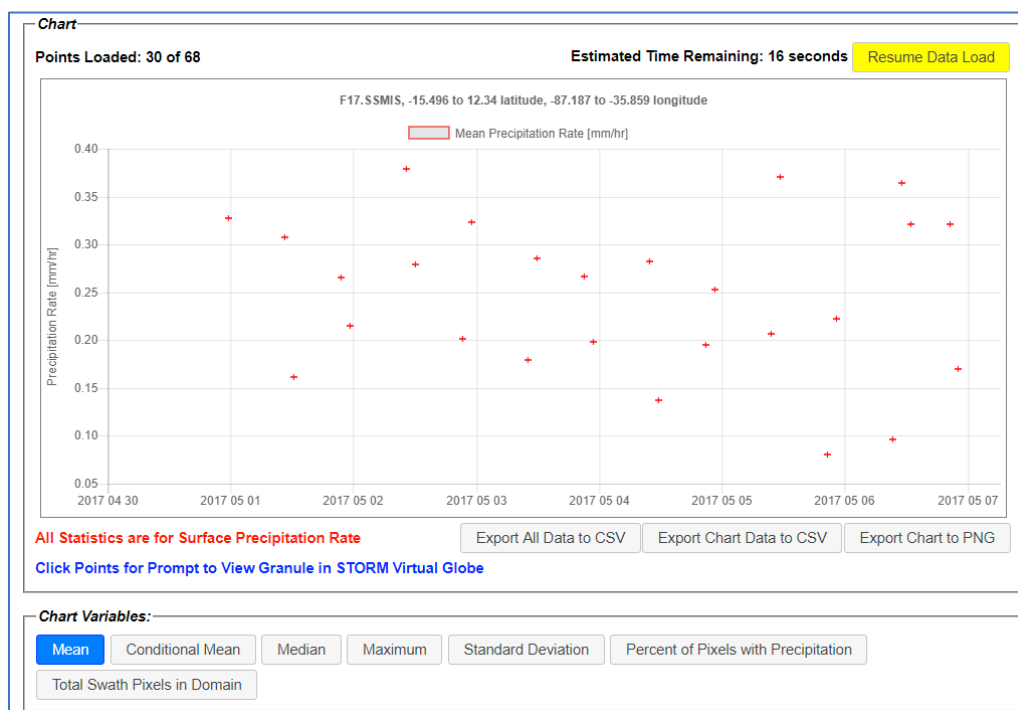
The other way to draw a box is to put values into the Latitude and Longitude fields and click the Draw button. This will generate a box in the map representing the corners you input. Pressing the Clear button will remove the box from the map and clear the Latitude and Longitude input fields. One final feature of this interface is that the Lat Lng field above the map will give you the Latitude and Longitude coordinates beneath your cursor if it is over the map area.

3.2 THE GRAPH INTERFACE

Upon pressing the Get Granules for Chart button, the site will immediately search for the list of granule files and start to process them. Processing grabs all of the statistical values for each granule for each product, and selected fields are visualized on the chart. Changing between statistics and products is seamless because all values are pulled in on initial load. The chart and values within it can be exported as an image or csv file.

3.2.1 While Data Are Loading

When the button, Get Granules for Chart is pressed, a list of granules in the date/time and geographic domain is generated and the code begins to loop through those granules to extract the statistical values for the chart. Values are added to the chart in groups of five, allowing for parallel processing without overloading the server. The first time that statistical values are loaded, the first product is automatically selected, and the mean values are displayed.



As values come in, the Points Loaded field updates continuously. Each time a group of five is added to the chart, the Estimated Time Remaining changes to reflect a rolling average of the time that the previous sets of granules took to process extrapolated for the number of remaining granules.

While the data continue to load, the user can click the Pause Data Load button, which will suspend processing of further granules once the latest set of five granules arrives. Pressing this will allow interaction with the values that have been received on the chart. It will also enable changing the visible variable(s), product(s), and color(s). Data loading can resume by pressing the same button, for which the text has been updated to Resume Data Load.

3.2.2 Changing the Chart

Once the data have loaded (or data load has been paused), the user can change what is visible on the chart. The three selector fields below the chart control what is visualized: Chart Variables, Chart Instruments, and Chart Color and Point Style. The first two fields are interrelated – when multiple Chart Instruments are selected, only one Chart Variable can be selected. If only one Chart Instrument is selected, up to six Chart Variables can be visualized.

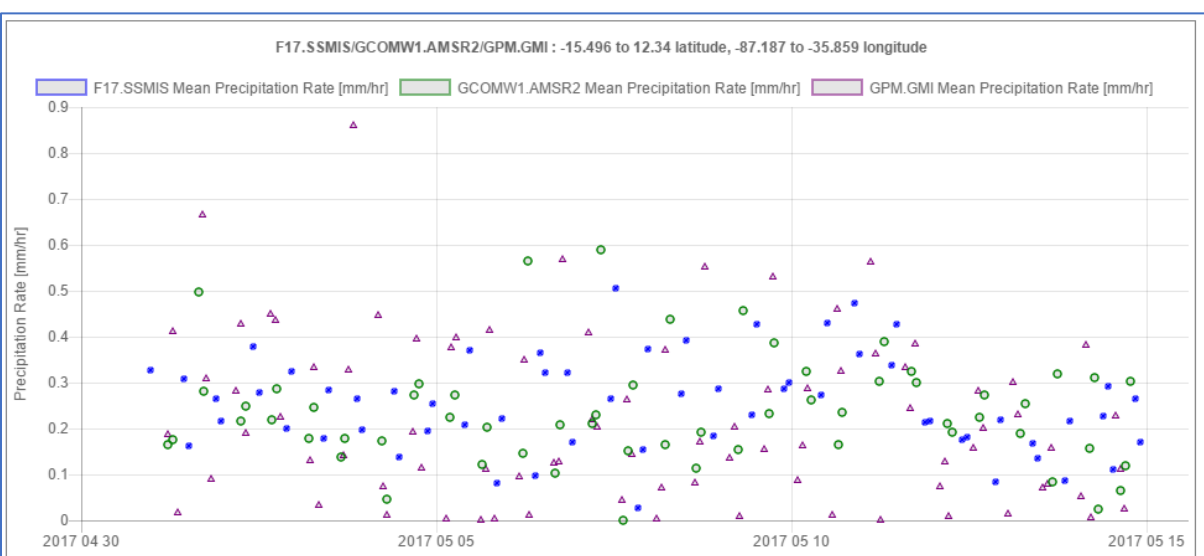
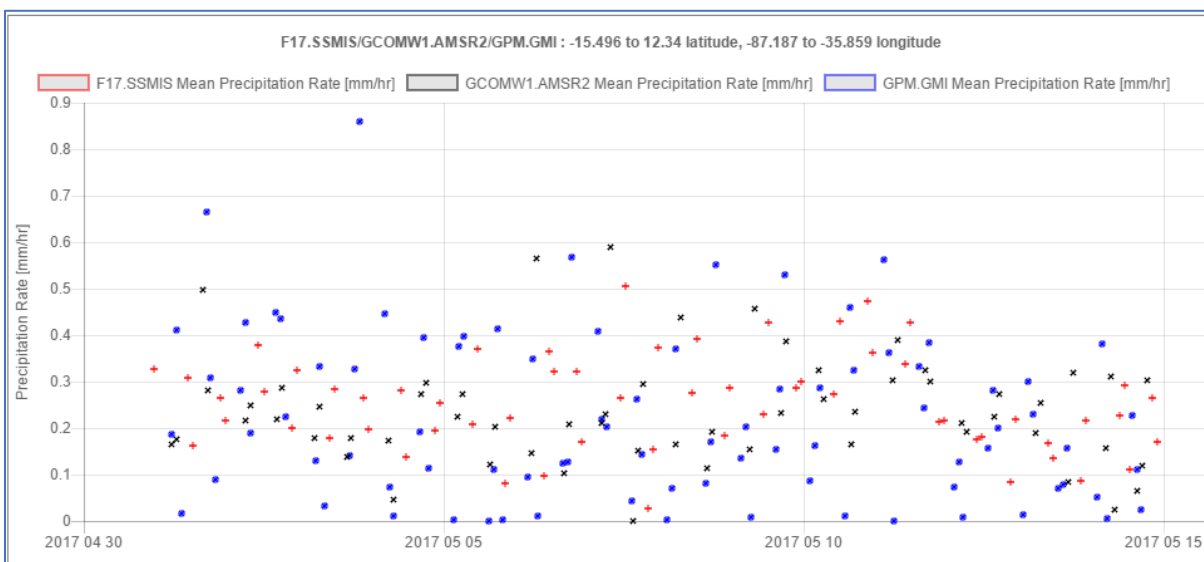
The screenshot shows a web-based control interface for a chart. It is divided into three main sections, each with a title and a set of buttons:

- Chart Variables:** This section contains seven buttons: "Mean" (highlighted in blue), "Conditional Mean", "Median", "Maximum", "Standard Deviation", "Percent of Pixels with Precipitation", and "Total Swath Pixels in Domain".
- Chart Instruments:** This section contains three buttons: "F17.SSMIS" (highlighted in blue), "GCOMW1.AMSR2", and "GPM.GMI".
- Chart Color and Point Style:** This section contains six buttons: "Red - +", "Black - x", "Blue - *" (highlighted in blue), "Green - o", "Purple - ▲", and "Grey - □".

Some of the Chart Variables fields are self-explanatory: mean, median, and standard deviation. Conditional Mean is the average of all points where there is observed precipitation (whereas Mean is simply the average of all points, precipitation or not). Maximum refers to the highest precipitation rate pixel value within the domain. Percent of Pixels with Precipitation is the number of pixels with surface precipitation values greater than 0.5 mm/hr divided by the total number of pixels within the domain for the granule (multiplied by 100). Total Swath Pixels in Domain gives the number of pixels within the domain, which gives the user a sense of whether the swath simply grazed the domain or went completely over it.

Chart Instruments are ordered based when their first swath's information comes into the browser, so the ordering can change from query to query. Due to technical issues, this set of buttons is regenerated for each query, so values selected to appear on the chart will not carry over, instead the first instrument will be selected by default. As with Chart Variables, a maximum of six instruments can be selected at any one time.

Chart Color and Point Style features a rotating set of different colors and icons for the chart. If more than one variable or instrument is selected, the first set of values will be denoted with the color/style selected, and subsequent sets of values will appear in the color(s)/style(s) after, going from left-to-right and wrapping around if necessary. In the first chart below, the three fields are shown with red, black, and blue colors respectively. When the button for Blue-* is selected, the fields then change to blue, green, and purple colors/styles, shown in the second chart.

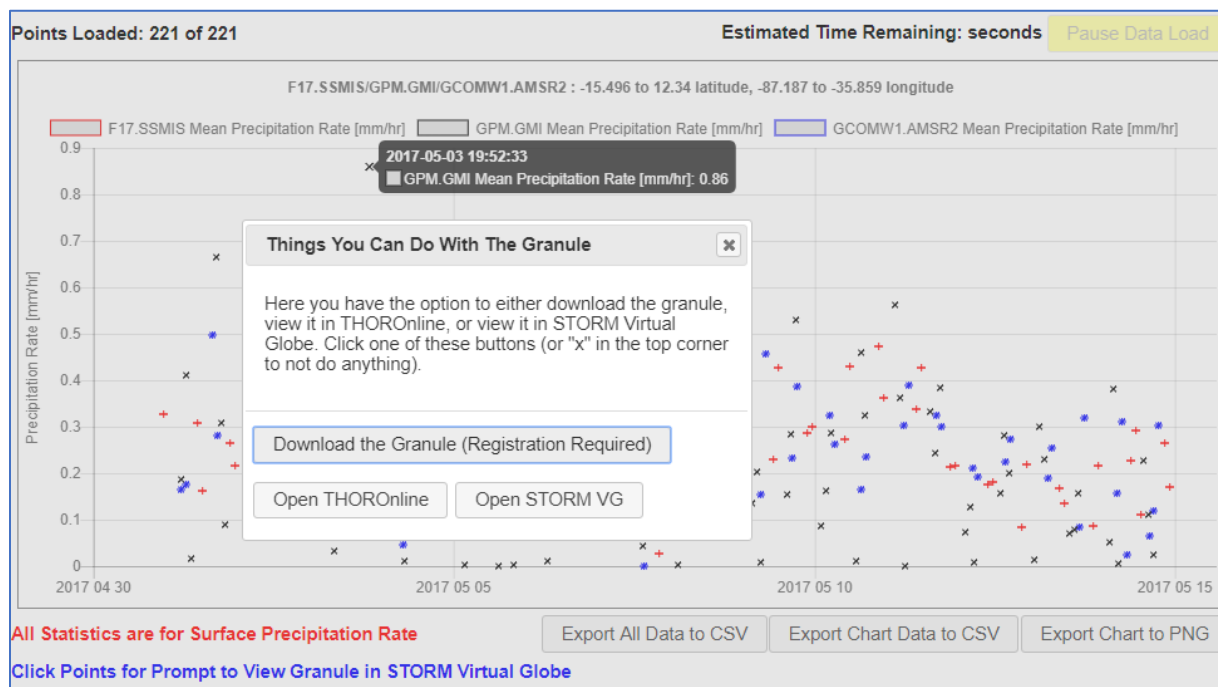


3.2.3 Interacting with the Chart

Beyond a flexible and visually compelling appearance, the chart is quite powerful from an interactivity perspective. One thing to note first, however, is that while data are loading, the chart is not interactive – it will not respond to mouseover or on-click events. If the data load is paused, then interactivity will return.

The two primary modes of interaction are mouseover and on-click. The former displays a tooltip that contains the specific date/time of the overflight and the raw value for the selected field. If more than one variable or product are selected, the tooltip will display all of the simultaneous values, whether that's multiple variables for a single granule, or multiple instruments for a single platform.

The latter connects the Analysis tool with visualization tools and the data file itself. When a point is clicked, the window below pops up, asking if you would like to download the granule, open a THOROnline window, or be taken to the STORM VG visualization of the selected granule. Note that as is typical of STORM VG, if GPM GMI or GPM DPR are selected, both will be displayed simultaneously.



3.2.4 Exporting Data

The Analysis tool offers three different things that can be exported in two different formats. The primary thing for export is the chart itself, which can be saved as a PNG file. The filename attempts to represent the statistic(s) visualized, the geographic domain, and the instrument(s) displayed.

The other two exports are in .csv format (comma-separated value). The user can either export the data visible on the chart currently, or all of the data gathered when the request was performed. The difference is that the former is likely significantly smaller, but better if you are only interested in the specific variable(s) or instrument(s) visualized. The latter includes all six variables and all of the products queried initially. An example of this is shown below.

	date/time	mean[mm/hr]	median[mm/hr]	max[mm/hr]	std[mm/hr]	var[mm/hr]	perc[%]	count[number]	platform
1	2017-04-30	22:54:36	0.032	0.0	0.76	0.119	0.014	8.51	505,METOPB.MHS
2	2017-04-30	23:56:43	0.037	0.0	18.96	0.39	0.152	3.02	66860,GCOMW1.AMSR2
3	2017-05-01	00:26:29	0.112	0.0	7.93	0.381	0.145	15.63	44763,GPM.GMI
4	2017-05-01	00:27:41	0.13	0.0	16.31	0.521	0.271	12.5	35140,GPM.DPR
5	2017-05-01	01:35:05	0.064	0.0	11.81	0.355	0.126	7.51	137258,GCOMW1.AMSR2
6	2017-05-01	02:03:38	0.02	0.0	1.13	0.081	0.007	7.33	17521,GPM.GMI
7	2017-05-01	02:05:15	0.0	0.0	1.58	0.016	0.0	0.07	13005,GPM.DPR
8	2017-05-01	04:13:17	0.0	0.0	0.0	0.0	0.0	0.0	7,F18.SSMIS
9	2017-05-01	05:45:59	0.025	0.0	2.74	0.141	0.02	5.17	36169,F18.SSMIS
10	2017-05-01	07:27:55	0.057	0.0	4.16	0.18	0.032	14.27	41141,F18.SSMIS
11	2017-05-01	07:45:50	0.012	0.0	3.35	0.1	0.01	2.74	4958,METOPB.MHS
12	2017-05-01	09:25:56	0.042	0.0	6.71	0.261	0.068	6.14	14601,METOPB.MHS
13	2017-05-01	11:05:30	0.02	0.0	23.92	0.297	0.088	1.8	94260,GCOMW1.AMSR2
14	2017-05-01	11:06:43	0.072	0.0	2.68	0.243	0.059	13.09	9307,METOPB.MHS
15	2017-05-01	12:44:22	0.076	0.0	7.22	0.336	0.113	11.61	135999,GCOMW1.AMSR2
16	2017-05-01	14:01:59	0.103	0.0	15.8	0.656	0.43	5.71	11120,GPM.GMI
17	2017-05-01	14:03:06	0.115	0.0	39.5	0.764	0.584	8.15	8567,GPM.DPR
18	2017-05-01	14:23:15	0.017	0.0	1.95	0.073	0.005	7.33	45623,GCOMW1.AMSR2
19	2017-05-01	15:34:34	0.073	0.0	52.11	0.533	0.284	7.45	42910,GPM.GMI
20	2017-05-01	15:35:41	0.113	0.0	60.81	0.701	0.491	8.66	33440,GPM.DPR
21	2017-05-01	17:07:35	0.039	0.0	4.4	0.249	0.062	6.15	43039,GPM.GMI
22	2017-05-01	17:08:45	0.01	0.0	4.67	0.108	0.012	1.47	32694,GPM.DPR
23	2017-05-01	17:16:13	0.045	0.0	7.87	0.219	0.048	8.99	41527,F18.SSMIS
24	2017-05-01	18:46:56	0.047	0.0	1.41	0.155	0.024	12.59	8472,GPM.GMI
25	2017-05-01	18:48:12	0.057	0.0	2.0	0.226	0.051	7.49	5034,GPM.DPR
26	2017-05-01	18:58:10	0.024	0.0	1.17	0.088	0.008	8.0	23565,F18.SSMIS
27	2017-05-01	19:11:15	0.03	0.0	3.3	0.173	0.03	5.05	11934,METOPB.MHS
28	2017-05-01	20:23:33	0.14	0.0	5.82	0.478	0.229	13.72	2136,GPM.GMI
29	2017-05-01	20:52:16	0.051	0.0	2.64	0.21	0.044	9.29	14258,METOPB.MHS
30	2017-05-01	20:52:16	0.051	0.0	2.64	0.21	0.044	9.29	14258,METOPB.MHS

3.2.5 Ordering Data

Below the chart customization fields is a box that contains inputs and dropdowns for ordering geographically subset granules that have values beyond some threshold in the chart. The first thing required is a PPS registered email address, which gives access to ordering files and will serve as your login to the ftp page where you can access those files. Next, the user selects a variable by which to filter, which includes all of the Chart Variables. Then, they select whether they want the granule to have a variable value greater than or less than the number they are putting in the next input field. Finally, they input a threshold number. If the user wants all files, simply leave the variable as mean, the direction as “greater than,” and set the value to -1.

Submit Order Based on Criteria:

Registered Email: [Don't have a PPS Registered Email? Register Here!](#)

Order All Granules With:

**All granules will be geographically subset to the scans within the specified domain*

Once all of these fields are set, they can press the Submit Order button, which will submit the order to PPS to be processed. Once accepted, an alert window will pop up with the order number, and once completed, the user will receive an email at their registered address. Below is an example of what the interface looks like when filled out.

APPENDIX A. ACRONYMS AND ABBREVIATIONS

CMB	Combined Data Product
CSV	Comma-Separated Value
DPR	Dual-Frequency Precipitation Radar
GMI	GPM Microwave Imager
GPM	Global Precipitation Measurement
GPROF	GPM Profiling Algorithm
GRIB	Gridded Binary
GV	Ground Validation
HDF	Hierarchical Data Format
IMERG	Integrated Multi-Satellite Retrievals for GPM
L1B	Level 1B
PMM	Precipitation Measurement Missions
PPS	Precipitation Processing System
THOR	Tool for High-Resolution Observation Review
TKIO	PPS Science Algorithm Input/Output Toolkit
TLE	Two-Line Element
TRMM	Tropical Rainfall Measuring Mission
VIRS	Visible and Infrared Sensor